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February 20, 1834.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,  
President, in the Chair.

The reading of Dr. Philip's paper was resumed and concluded.

The object of the present paper, which the author intends as a sequel to those he has lately presented to the Society, and which have been published in the Philosophical Transactions, is to investigate the operation of the different causes of death, and the mode in which the several powers of the living system influence each other during the period of their decline. In the more perfect animals, he observes, there are three distinct classes of functions, namely, the sensoria, the nervous and the muscular, which have no direct dependence on each other, although they are linked together by the connexions of the organs in which they reside; the consequence of which is, that the cessation of any one class of functions is more or less immediately followed by the destruction of the rest. What is commonly called *death* consists in the extinction of the sensorial functions only; for the nervous and muscular functions may still, for a time, survive; although, in consequence of the failure of respiration, which in the more perfect animals the author considers as, in the strictest sense, a function of volition, they also speedily terminate. Thus he distinguishes this sensorial death from what constitutes actual death, that is, the cessation of all the functions, and which occurs at a later period. As far as the sensorial powers are concerned, their decline and cessation are exceedingly analogous to the approach and occurrence of sleep; the only difference being that the former is an irrevocable failure of those powers, while the latter admits of their being resumed with renovated vigour by the continued action of the vital powers.

The modes in which the sensitive functions are extinguished, or in other words *the forms of death*, are referred by the author to five different heads: the first and only natural mode is that from the simple effect of old age, when all the powers of life are completely exhausted by the continued operation of the agents which had excited them; and death is, in that case, only the last sleep. The vital functions are here impaired, chiefly from the diminished frequency of respiration, which is itself a consequence of the impaired sensibility; so that there is a diminution of the action, but not of the powers, of the vital organs. If the decay of the vital powers be gradual, and nothing occurs suddenly to accelerate it, they will necessarily cease at the time when their excitement is the smallest, that is, during the state of sleep.

In all other cases, death arises from causes which must be regarded as adventitious, and consequently inducing a more or less violent death. The first class of these causes comprises those arising from the continued action of stimulants, more powerful than the ordinary stimulants to which the system is subjected, and making their immediate impression on the organs of the sensitive system. These may be considered as producing a diseased condition of the sensorium,

which, by sympathy, communicates its influence to the vital organs. The next form of death is that which is induced by such causes as are applied, in a sufficient degree, to act as direct sedatives to the organs of the sensitive system, that is, to impair their excitability without previous excitement. The third set of causes of death comprehends those which operate by depriving some of the vital organs of those stimulants on which their functions depend; and the last consists of such as directly debilitate those organs themselves. Thus, according to the author, these adventitious causes act either directly by destroying the power of the brain and spinal cord, or by affecting the vital parts of those organs, so as, through them, to destroy the circulation or the assimilatory functions. The destruction of the circulation appears, in all cases, to be the cause of instantaneous death, and always to be effected through impressions made on the vital parts of the brain and spinal cord, except where the injurious agent operates directly on the organs of circulation themselves.

The author considers the vital functions, together with the muscular and nervous powers, which carry them on, as the results of inanimate agents acting on living parts, or living parts on them; and hence he explains the analogy which exists between all these functions and the operations of inanimate nature; while, with regard to the sensorial functions alone, as they are the results of vital parts acting on each other, so no analogy can be perceived between them and those operations.

In the course of the paper the author frequently reverts to the argument, that, to the sentient being, death being simply the loss of sensibility, the last act of dying can in no case be an act of suffering: and in the majority of instances of the long continuance of disease, our tastes, and our relish for life itself, being gradually impaired, death is met, not only with composure, but even with satisfaction.

A paper was then read, entitled, "On the Tides." By John William Lubbock, Esq., V.P. and Treasurer of the Royal Society.

Various tables relating to the tides are communicated in this paper, calculated, according to the instructions of the author, by Mr. Dessiou. In the tables given by the author in former papers, already published in the *Philosophical Transactions*, and having reference to the corrections due to the influence of the parallax and declination of the moon, Mr. Dessiou employed only observations of the tides made between conjunction and opposition; but in those now given, similar corrections have been obtained from observations made between opposition and conjunction.

The author enters into an inquiry into the correction due to the calendar month, which is mixed up with that due to the moon's declination, and shows that the correction for the moon's parallax, as well as declination, deduced from the theory of Bernoulli, are quite discordant with the results of Mr. Dessiou's calculations, founded on actual observation.

The author agrees with Mr. Whewell in the remark, that the theory of the tides is now in the same state as that which the theory of the